

REMARKS

Claims 1-15 are present in this application. Claims 13-15 have been withdrawn. Of the elected claims, currently claims 1, 3 and 4 are independent claims.

Allowable Subject Matter

Applicants wish to thank the Examiner for indicating that claims 3-9, 11, and 12 contain allowable subject matter.

Claim Rejection under 35 USC 102(b) – Koike

Claims 1, 2, and 10 have been rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,781,253 (Koike). Applicants respectfully traverse this rejection.

Summary of the Claimed Subject Matter

The present invention addresses a problem with electrostatic discharge (ESD) that can occur during manufacturing of a liquid crystal display device. During a conventional manufacturing process for a liquid crystal display device, electrostatic discharge can occur during the step of depositing a source film and patterning to form source bus lines SL and connection patterns CP for connecting the gate bus lines GL with gate terminals GT (see present Fig. 19). In particular, ESD occurs in a case where the distance 'a' between the through hole GO of the gate terminal GT and the storage capacitor stem CsT is shorter than the distance 'b' between the through hole GO of the gate terminal GT and the through hole GO of the gate bus line GL. In this case, leakage can occur between the gate bus line GL and the storage capacitor line Cs, which can lead to defects in the liquid crystal display device. (Specification at pages 2-3).

The present invention addresses this problem by providing a contact window in the insulating film on a short ring so that accumulated charge is allowed to flow to the short ring when the source film is deposited.

In particular, embodiments related to claim 1 are directed to a wiring substrate that includes

- a short ring (SR; see Fig. 17) formed along a periphery of the wiring substrate,
- an independent line pattern (e.g., gate terminal GT) that is coplanar with and independent of the short ring,
- a continuous line pattern (e.g., storage capacitor stem CsT) that is located closest to the independent line pattern and is coplanar and continuous with the short ring, and
- an insulating film (e.g., gate insulating film GI) covering the independent line pattern and the continuous line pattern,

wherein the insulating film includes a first through hole (e.g., through hole GO1) reaching the independent line pattern and a second through hole (e.g., through hole GO2) reaching the continuous line pattern.

Provided the arrangement of the claimed invention, upon depositing the source film SF, the charge accumulated on the gate terminal GT moves to the storage capacitor stem CsT, which is connected to the source film, via the first through hole and second through hole (specification at page 9, lines 9-13).

Koike

Koike is directed to prevention of the occurrence of static failure during the manufacturing process of a liquid crystal display before the short ring is formed (Koike at col. 2, lines 62-65). Koike points out that a short ring is typically formed simultaneously with the formation of data lines in a “cell step” in which the source/drain electrodes and signal wiring are formed, which is after the gate lines are formed in an “array step.” (steps defined at col. 2, lines 24-34, and shown in Fig. 10). Koike points out that subsequently there is no effective countermeasure for preventing static failure throughout the array step (col. 2, lines 47-50).

In addition, Koike discloses that in a later step of forming the short ring, the disconnected gate lines can be restored to the original gate lines by connecting them to the other metal wiring layer, and the antistatic measures can be transferred to the short ring (col. 3, lines 34-37).

Differences over Koike

The Office Action refers to Fig. 8, element 6 of Koike for teaching the claimed short ring, and Figs. 1-3 of Koike for other claimed elements. To the contrary, Applicants submit that none of the drawings in Koike show a short ring (Fig. 10 only shows a manufacturing step where a short ring is formed). Although relied on in the Office Action, sealing agent 6 does not constitute a short ring, as would be understood by one of ordinary skill in the art.

As noted above, Koike is directed to prevention of the occurrence of static failure during the manufacturing process of a liquid crystal display in a step before the short ring is formed. Koike discloses that in the later step of forming the short ring, the disconnected gate lines can be restored to the original gate lines by connecting them to the other metal wiring layer, and the antistatic measures can be transferred to the short ring (col. 3, lines 34-37). In other words, gate lines 46 would be connected to the short ring in a conventional manner (i.e., similar to the case shown in present Fig. 17), so that antistatic failure would be handled by the short ring when the connecting layer 48 is formed.

On the other hand, the present invention solves a problem with the occurrence of electrostatic discharge in a line pattern that is not functionally related to the independent line pattern, i.e., a pattern that is not a disconnected gate line that is continuous with the short ring.

In order to clarify this distinction, claim 1 has been amended to clarify that the continuous line pattern serves a distinct function in the wiring substrate from the independent line pattern.

For at least the above reasons, Applicants submit that Koike fails to anticipate the claimed invention. Accordingly, Applicants request that the rejection be reconsidered and withdrawn.

CONCLUSION

In view of the above amendment, applicant believes the pending application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Robert Downs Reg. No. 48,222 at

Application No. 10/664,158
Amendment dated February 20, 2007
Reply to Office Action of November 17, 2007

Docket No.: 4633-0105P

the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

Dated: February 20, 2007
(Tuesday after Federal Holiday)

Respectfully submitted,

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